SUMMARY OF *RESTORATION PLAN FOR THE CLARK FORK RIVER AND BLACKFOOT RIVER NEAR MILLTOWN DAM*, OCTOBER 2005

Introduction

This document summarizes the State of Montana's October 2005 version of the Restoration Plan (RP) designs for the Clark Fork River (CFR) and Blackfoot River (BFR) near the Milltown Dam. An April 2005 version of the RP was prepared for a peer review panel review and comment. The panel was comprised of national experts in the fields of engineering, hydrology, and ecology. The State revised the April 2005 RP in October 2005 to address the comments and suggestions of the peer review group. This summary includes revisions to the April 2005 RP based on the peer reviewers comments. The State is now seeking public comment on the October 2005 RP. Additional information is available for those seeking a greater level of technical detail (see page 7).

Information included in the October 2005 RP includes results of the data collection, analysis, and modeling efforts completed in 2004 and 2005 by the State and its contractors (primarily WestWater Consultants and The River Design Group, but also GEUM Environmental Consulting and Wildland Hydrology). The analyses served the following primary purposes:

- To determine or characterize the likely historical conditions of the CFR and BFR in the vicinity of the confluence;

- To characterize the existing conditions of the CFR and BFR in the cleanup area and in upstream reaches;

- To propose future morphological characteristics for restoring the CFR and BFR channels in the vicinity of Milltown reservoir based on data and analyses.

Background

The State, in conjunction the Trustees, US Fish and Wildlife Service, and the Confederated Salish and Kootenai Tribes, is conducting restoration planning to integrate with remedial actions at the Milltown Dam. The following are the steps the State has taken or will take to complete this restoration:

- Produced and solicited public comment on the Draft Conceptual Restoration Plan (DCRP), April 2003.
- Amended the DCRP per Public Comment, EPA Revised Proposed Plan, Stipulation with NorthWestern Corp. (June 2003).
- Conducted Phase II data collection and analyses leading to Draft Restoration Plan
    - Data collection and processing, June 2005 thru March 2005
    - April 2005 Restoration Plan completed
- Conducted Peer Review of April 2005 RP (May / June 2005)
- April 2005 RP revised per Peer Review comments (October 2005)
- Solicited public review of October 2005 RP (November 2005)
- Finalization of Restoration Plan (January / February 2006)
- Implementation of Restoration Actions (2006 - 2009*)

* Aspects of restoration schedule are dependent on remedial action schedule.

Restoration Strategies

a. River and Floodplain Design

Figure 1 shows the selected channel and floodplain alignments "D" and "C" that will be further analyzed in the design process. At this time, the State and peer reviewers prefer alignment "D", which is shown on the Figures. Figure I-6 in the DRP (April 2005) shows all of the channel alignments that were analyzed for the CFR upstream of the Milltown Dam.

The channel alignment downstream of the Milltown Dam will follow the current alignment. On the BFR, the channel alignment will follow the existing channel through the bridges and upstream, but the width of the river will be approximately 175 feet compared to the current width of 250 to 300 feet. Additional floodplain will become available along the BFR due to the lowering of the water surface elevation.

Floodplain design is in two different stages. Because of the Consent Decree negotiations, the floodplain design for the remediation project area (see Figure 2) is at a higher level of completion than for any other floodplain reaches. Conceptually, CFR3's floodplain will be similar to the floodplain shown in Figure 2. The exact layout and location of wetlands, terraces, and other features will be developed in final design.

The elevation of the CFR floodplain needs to be lowered from Duck Bridge upstream approximately 2,500 linear feet so that the gradient of the floodplain, channel bed, and water surface within this area matches the gradients upstream and downstream. By matching the gradients as close as possible, the transition of the river into and out of the restored area will increase overall project success and bring the river and floodplain down to near the historical elevation.

b. Riparian and Wetland Design

As indicated above, the design for the riparian and wetlands in CFR 2 and CFR3 are at different levels of completion. CFR 2 and CFR 3 will have a similar riparian and wetland designs. There will be upland areas, floodplain areas, and wetlands. The uplands areas are located outside the active floodplain. The floodplain includes areas that are inundated during flood flows; the floodplain will be regraded to create micro-topographic relief to create a complex floodplain surface. Wetland development will be optimized within all areas of restoration work. Figure 2 shows the draft design for CFR2. All designs will be finalized after coordination with landowners.

Goals and Objectives[1]

The Trustees revised the goals and objectives presented in the April 2003 DCRP for the October 2005 RP per the peer reviewer's recommendations. The review panel agreed with the conceptual goals and objectives but suggested more explicit wording that corresponded with our more detailed data and understanding of the site. See box on page 3 for details.

[1] These goals and objectives were refined for the April 2005 RP. These goals and objectives will need to be refined further during the Final Design to reflect the monitoring that will be identified to measure the success of this project.

Goals and Objectives

Following are the more detailed restoration goals and objectives revised per the peer reviewers recommendations. The review panel agreed with the conceptual goals and objectives but suggested more explicit wording that corresponded with our more detailed data and understanding of the site.

Overall Project Goal: *Restore the confluence of the Blackfoot and Clark Fork Rivers to a naturally functioning, stable system.* This goal can be achieved with the understanding that:

- Infrastructure (bridges, roads, railways, etc), contaminated sediment repositories, private land and the geomorphic setting must be maintained; and
- Erosion and migration of the river channels is part of a naturally functioning and stable river system. In the long-term, vegetation such as cottonwoods and willows is integral this restoration;

For the short-term (15-25 years) after reconstruction, structures will be relied upon to provide stability until the vegetation is mature. To the extent possible, structures will be similar to those naturally occurring in less altered sections of the rivers.

1. Goal: *Improve water quality by reducing the erosion of contaminated sediments.*
   - Native rock, wood, and vegetation will be used to construct instream, streambank, and floodplain structures mimicking natural structures found in other, similar Montana rivers; non-native biodegradable material may be used.
   - Bank and in-stream structures will be installed to maintain channel and floodplain stability until vegetation has matured on the floodplain and streambank;
     - After the streambank and floodplain vegetation has matured (15 to 25 years), the channel and bank structures will have degraded allowing the river to migrate and develop channel(s) naturally across the floodplain

2. Goal: *Provide channel and floodplains that will accommodate sediment transport and channel dynamics appropriate for the river and valley setting.*
   - Design parameters for the channel to allow the 1.5 to 2.0 year flood frequency to access the floodplain. Design of the floodplain, terrace, and wetland features will accommodate all levels of flooding consistent with setting. Channel and meander geometry will remain consistent over time.
   - Revegetation of the streambank and floodplain using a diverse community structure will be an integral part of the floodplain design.

3. Goal: *Provide high quality habitat for all native fishes and other trout, including continuous upstream and downstream migration while minimizing habitats that will promote undesirable fish species.*
   - Channel design will provide habitat features similar to reference conditions and consistent with stream type or geomorphic setting. Instream and bank structures will maintain habitat features until bank and floodplain vegetation matures allowing the geomorphic forces to create this habitat naturally.
   - To the extent practicable while restoring these large river systems, habitats favorable to northern pike or other potential undesirable species, e.g. shallow, slow, and warm water will be eliminated.

4. Goal: *Provide functional wetlands and riparian communities, where feasible.* These communities will also provide improved riparian and wildlife habitat within the restored area.
   - Wetland design will reference upstream and downstream wetland areas.
   - Use of a diverse vegetation plan will improve wetland quality.
   - A majority of the floodplain should develop into wetlands, but is dependent on groundwater elevations after dam removal.
   - Revegetation activities proposed will increase floodplain vegetation diversity and provide for long-term floodplain and channel stability.

5. Goal: *Improve visual and aesthetic values through natural channel design, revegetation and the use of native plants and materials.*
   - The design will create a riparian zone that has a diverse vegetative cover.
   - The river channel design will function similar to reference sections.
   - Revegetation, floodplain, and channel design will consider other proposed land uses.

6. Goal: *Provide safe recreational opportunities compatible with other restoration goals, such as channel and floodplain stability, sediment transport, and fish habitat.*

Establishing a naturally functioning system within the boundaries and limits present at the site are a priority; however, safety considerations will be evaluated with every aspect of the project. A totally safe river system cannot be built; rivers are inherently dangerous, and a system that is similar to other rivers in similar environments within Montana will be used to guide decision makers.

Description of Restoration Project Area

Reach Delineation

The October 2005 RP covers four river reaches (see Figure 3):

- CFR1, from confluence of the CFR downstream to the I-90 bridge;
- CFR2, from the confluence of the CFR and BFR upstream to Duck Bridge;
- CFR3, upstream from Duck Bridge approximately 9,000 linear feet; and
- BFR1, from the confluence of the CFR and BFR to just downstream of Stimson Dam.

In the April 2003 DCRP, the State also proposed work in areas upstream of this project area on the CFR and BFR. In order to integrate with the Superfund remedial actions at Milltown, however, the State confined initial restoration work within the four river reaches outlined above. The upstream reaches may be subject to other future restoration efforts.

Landownership

Northwestern Corporation owns a majority of the property within the project area. The future status of this ownership has not been finalized. The State has an option, exercisable under certain conditions, to acquire ownership of some or all of this property. This option will be further negotiated with Northwestern Corporation once the Consent Decree is final.

The rest of the property is in private ownership. The State has met with several of the major landowners and will continue to meet with others in the coming months. In order to avoid confusion, the State has deferred contacting landowners until potential channel alignments are determined.

Site Constraints Affecting Restoration

Restoration work at the Milltown site is limited by a number of site constraints over which the State does not have complete control. The following constraints were considered during the RP development:

a. Sediments Left In Place

EPA determined that the contaminated sediment in Sediment Accumulation Areas (SAA) SAA II, IV, and V and some of the sediments within SAA I and III (see Figure 2) are not a threat to human health or the environment and has chosen to leave these sediments in place. In addition, some highly contaminated sediments will be left in-place along the Interstate 90 embankment and in the existing CFR channel (SAA IIIb). EPA is requiring the SAA IIIb sediments (~330,000 cubic yards) be located out of the 100-year floodplain and protected from scouring. Removal of the SAA I sediments near the Interstate 90 embankment will not be required in order to facilitate construction of the bypass channel. These sediments will also be protected from scouring. Due to costs of removal the State is not proposing additional removal of these sediments under the restoration actions.

b. Existing Infrastructure

Seven bridges are within the restoration project area (see Figure 3). Five of the bridges are located on the BFR, including the two Interstate 90 bridges, the railroad bridge, the Highway 200 Bridge, and the decommissioned county bridge. On the CFR, the railroad bridge is immediately downstream from Milltown Dam, and the Interstate 90 Bridge is located approximately one mile downstream. Other

important infrastructure in the area includes the Interstate 90 highway embankment, secondary roads in the transportation corridor, and land development paralleling the rivers. This infrastructure requires consideration during final design phase.

c. Recorded Archaeological Sites

There are five recorded archaeological sites in the vicinity of Milltown Reservoir. None of these sites are expected to be affected by Milltown restoration. The State will continue to consult with the other Trustees and EPA regarding such sites during the design and the implementation of the RP to assure the protection of these sites.

d. Integration of Remediation and Restoration

The Consent Decree outlines specific actions that the State's restoration must complete within the remediation project area. For instance, the State will design the final channel and floodplain configuration, including dam removal depths, and the Settling Defendants will construct these aspects of the restoration design. Thus, the State's design for the remediation area will need to be completed by a date determined in the Consent Decree process.

The contractors completing the remediation work have a construction schedule. If certain restoration actions are to be integrated with aspects of the remedial process, the restoration schedule must be coordinated with the remediation schedule. An example of effective integration would be incorporating the excess excavation material from Reach CFR 3 into the backfill in CFR 2. The excess material generated in Reach CFR 3 will need to be available for use as backfill in when the Settling Defendant's are ready to use it as backfill in Reach CFR 2.

Design Process

a. Techniques used for design

Proposed restoration designs included in the RP have their basis in several methods including, analog (reference reach), empirical (regime and regional equations), and analytical (physical processes modeling) techniques. The State used different technical systems in our analysis that are standard within each of their particular disciplines. Systems may be delineated according to field and analytical techniques. Field techniques include methods for characterizing existing channel, aquatic habitat, and riparian conditions. Analytical techniques include remote sensing tools, and hydrologic, hydraulic, and sediment transport models.

b. Historical, Existing, and Desired Conditions

The State completed an analysis of the river and floodplain conditions to determine what it was like historically, it's current condition, and an evaluation of what it should be like in the future.

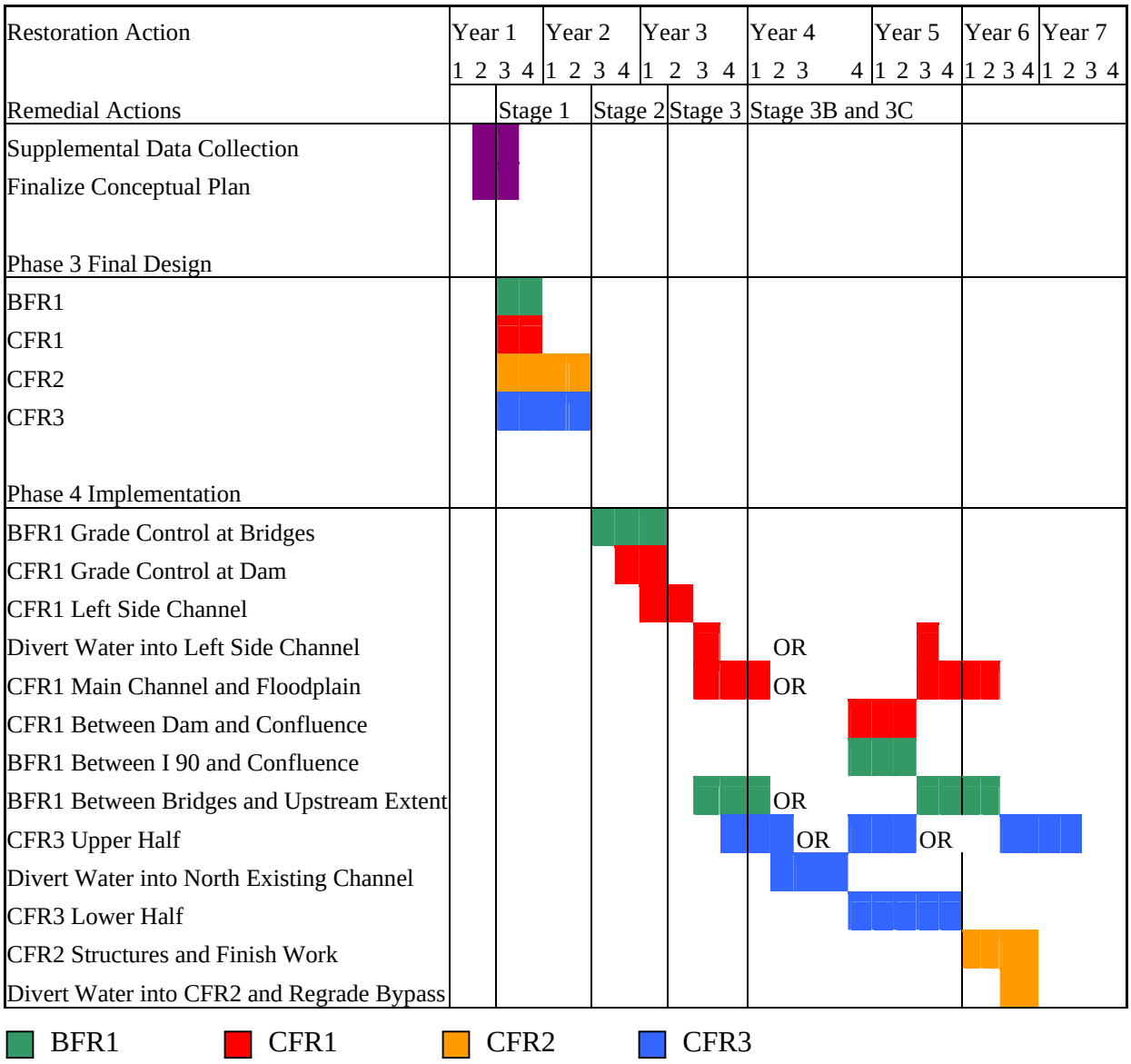
Before the transportation corridors were built within the CFR study reach near Milltown Dam, the natural extent of the floodplain was bounded on either side by high Pleistocene terraces and foothills of the Sapphire Mountains to the south, and the Garnet Mountains to the north. The CFR floodplain widths upstream from the BFR ranged from approximately 1,600 ft to 3,000 feet. Currently, the CFR floodplain at the most confined point, near the Duck Bridge, is reduced by approximately 50 percent relative to upstream reaches. A valley transition occurred from the Duck Bridge area downstream to Bandmann Flats. This transition and narrowing of the valley bottom considerably influenced the channel planform.

Currently, CFR upstream of the Milltown Reservoir is characterized by braided, multiple channel regimes as well as a potential reference or "best possible" state for the CFR. Sediment sources associated with eroding streambanks and bed instabilities were frequent with streambank erosion rating high to extreme. The primary factors maintaining braided channel conditions include: 1) abundant bedload supply; 2) high bank erodability reflecting the unstable channel conditions and altered riparian floristics; 3) direct and indirect effects of past channel straightening and railroad grade stabilization; 4) historical flooding and variable discharge; and 5) backwater effects induced by Milltown Dam and the Duck Bridge. The existing condition of the BFR immediately upstream of Milltown Dam is a reservoir setting.

The CFR and BFR cannot be restored to historical conditions due to past and ongoing disturbances. However, the analyses of historic and current conditions indicate that a meandering, single thread planform for the CFR upstream from the confluence is the preferred planform. With consideration given to existing infrastructure, the lower CFR and BFR could be restored to near-historical conditions.

Schedule

Restoration schedule for the CFR and BFR.



Public Involvement

The State has formed a design review team, which includes the US Fish and Wildlife Service, the Tribes, EPA and DEQ, to provide input into the restoration design process. In addition, EPA has agreed to allow one of the peer reviewers from the US Army Corp of Engineers to continue in a design oversight role. The State has also invited the Redevelopment Working Group, CFRTAC and Missoula County to join this review team, which will operate similarly to the design review team formed by EPA for the remedial design.

Interest Groups

The State intends to coordinate and integrate restoration activities with the activities of other groups interested in restoring the natural resources or replacing lost services at the Milltown Site, such as Milltown Redevelopment Working Group. Integration is a great way to save money and, to the extent practicable the State will work to accomplish this type of integration. The RP does not specifically discuss this type of integration because the RP is a document developed to integrate the restoration and remedial actions.

Additional Information Availability

Additional information is available for those seeking a greater level of technical detail. The October 2005 RP can be downloaded from the Natural Resource Damage Program's website[2] or compact disc (CD) copies can be requested by contacting the Natural Resource Damage Program at (406) 444-0205.

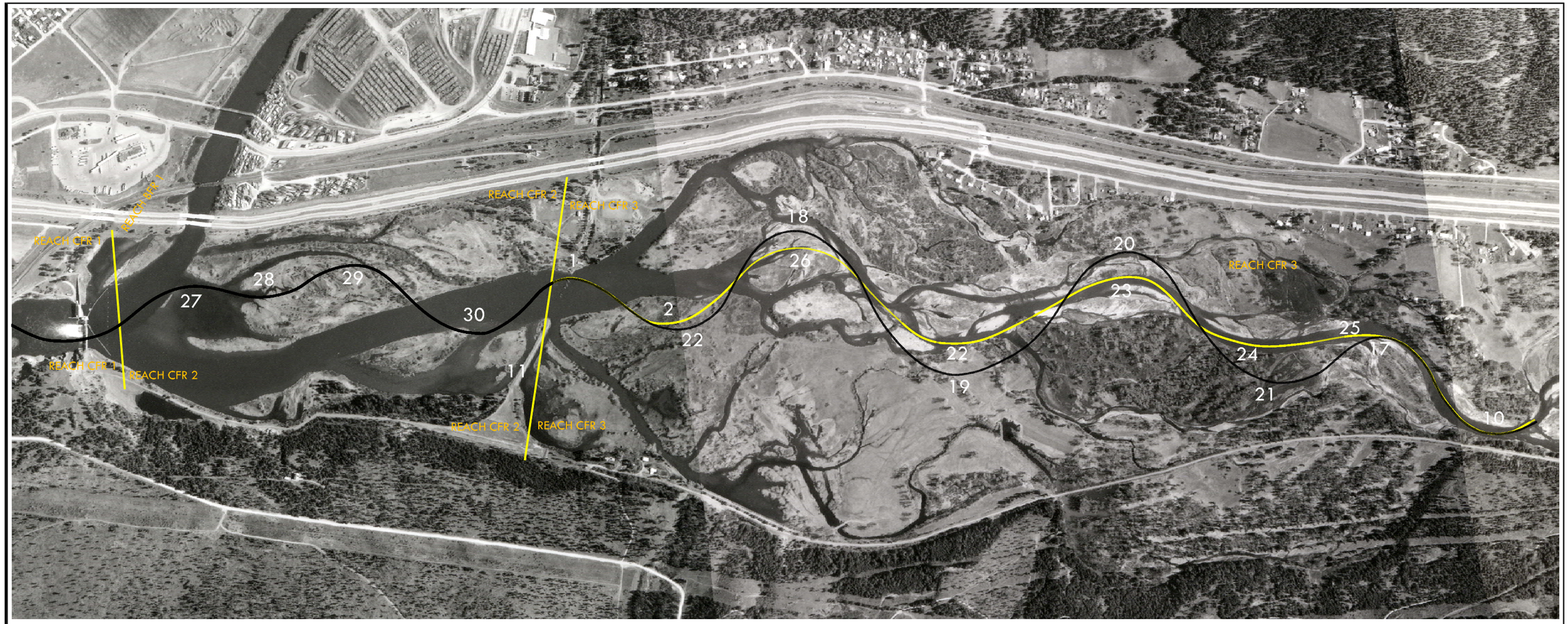
Public Comment

The State is accepting public comment on the October 2005 RP ending December 9, 2005. The State will prepare a responsiveness summary responding to the comments and provide it to the public. The public can submit written or electronic comments on or before December 9, 2005 to:

Doug Martin
NRDP/DOJ
P.O. Box 2011425
Helena, MT 59620-1425
dougmartin@mt.gov

The public can also provide oral comments at a **public meeting at 7:00 p.m. November 10, 2005 at the Saint Ann's Church in Bonner, Montana**.

[2] The NRDP website can be accessed at http://www.doj.mt.gov/lands/naturalresource/milltowndam.asp.



Planform Design Criteria						
Sinuosity	Belt Width (ft)	Width	Meander Length (ft	ML/W	Radius	R/W
1.15 - 1.3	600 - 1200	150	1500 - 2700	10.0 - 18.0	375 - 750	2.5 - 5.0

Alignment	Sinuosity	Belt Width (ft)	Meander	Meander Length (ft)	ML/W	Radius	R/W
C	1.23	722	*27*	1370	9.1	750	5.0
			28	1575	10.5	750	5.0
			29	2100	14.0	575	3.8
			30	2050	13.7	625	4.2
			1	1875	12.5	700	4.7
			2	1742	11.6	580	3.9
			18	2737	18.2	500	3.3
			19	3200	21.3	900	6.0
			20	3200	21.3	500	3.3
			21	2612	17.4	710	4.7
			17	2220	14.8	450	3.0
			10	N/A	N/A	500	3.3
			Average	2243.7	15.0	628.3	4.2

Alignment	Sinuosity	Belt Width (ft)	Meander	Meander Length (ft)	ML/W	Radius	R/W
D	1.15	719	*1*	1875	12.5	700	4.7
			2	1742	11.6	580	3.9
			26	2820	18.8	500	3.3
			22	3240	21.6	650	4.3
			23	2860	19.1	630	4.2
			24	2620	17.5	1200	8.0
			25	2480	16.5	740	4.9
			10	N/A	N/A	500	3.3
			Average	2519.6	16.8	687.5	4.6

1000 0 500 1000

SCALE: 1" = 1000'

NO.	DATE	BY	REVISION DESCRIPTION
3	10-20-05	MSD	FINAL - CHANGED FIGURE #
2	08-28-05	MSD	ALIGNMENTS C AND D SHOWN
1	04-13-05	MSD	DRAFT

PROPOSED CFR ALIGNMENTS AND MEANDER GEOMETRY

RESTORATION PLAN

DRAWN BY:	NMW
DESIGNED BY:	GTD
CHECKED BY:	MSD
PROJECT NO.:	RDG-04-018

FIGURE 1

FILE NAME: design plan view.dwg

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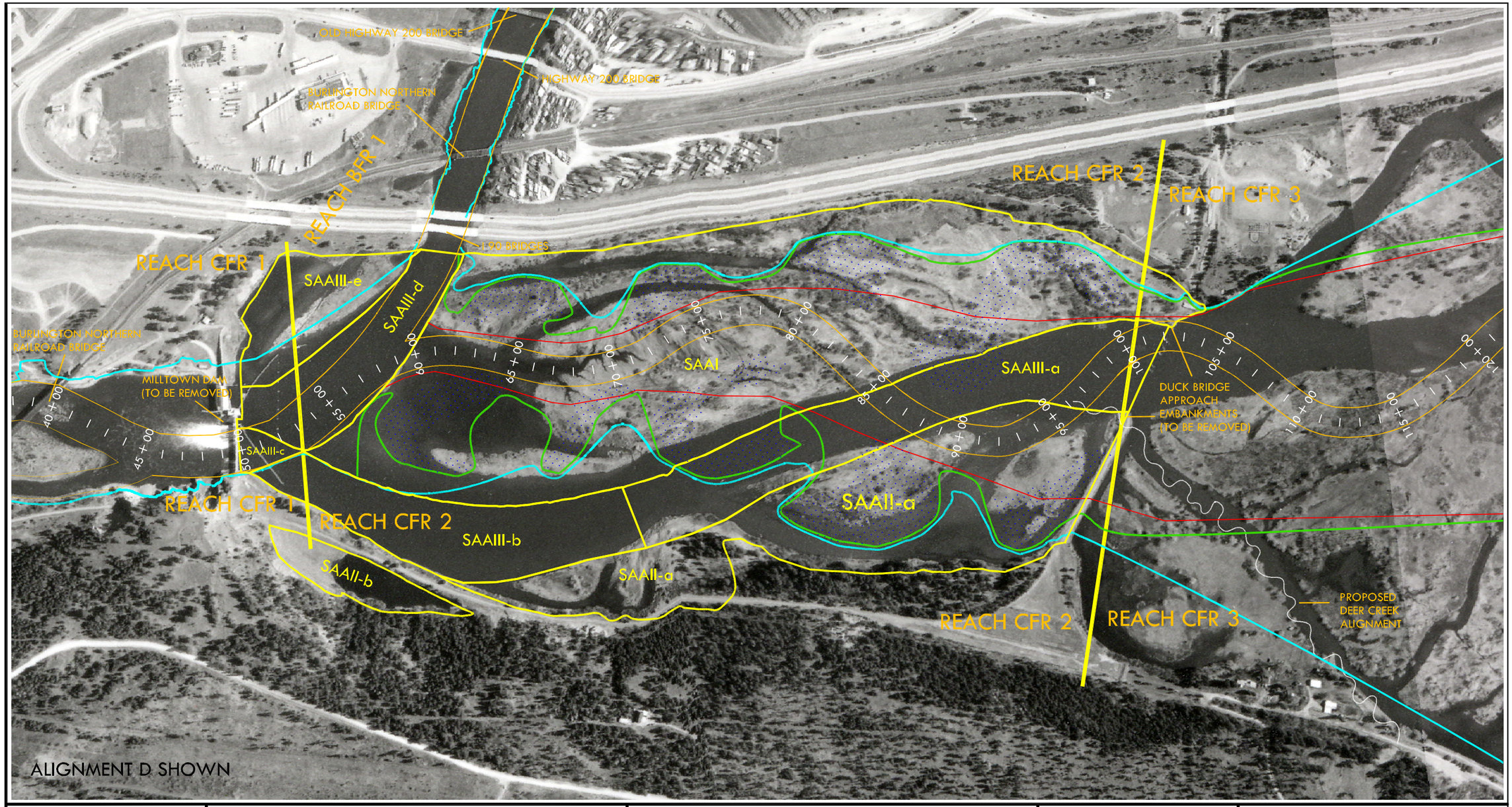

Legend

- Proposed Wetlands
- Proposedl Channel
- Bankfull Floodplain
- Approximate 100 yr Floodplain
- Low Terrace
- SAA Sediment Accumulation Areas

500 0 250 500

SCALE: 1" = 500'

NO.	DATE	BY	REVISION DESCRIPTION
1	08-29-05	MSD	ALIGNMENT D SHOWN
1	04-13-05	MSD	DRAFT

PLAN VIEW - CFR 2

RESTORATION PLAN

DRAWN BY:	NMW	FIGURE 2	
DESIGNED BY:	GTD		
CHECKED BY:	MSD	FILE NAME: design plan view.dwg	
PROJECT NO.:	RDG-04-018		

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RIVER DESIGN GROUP, INC.

Legend

Proposedl Channel

1200 0 600 1200

NO.	DATE	BY	REVISION DESCRIPTION
3	10-20-05	MSD	FINAL - CHANGED FIGURE #
2	08-28-05	MSD	ALIGNMENT D SHOWN
1	04-13-05	MSD	DRAFT

PLAN VIEW INDEX

RESTORATION PLAN

DRAWN BY:	NMW
DESIGNED BY:	GTD
CHECKED BY:	MSD
PROJECT NO.:	RDG-04-018

FIGURE 3

FILE NAME: design plan view.dwg

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